

## Gendering soil science research methods: a case study from Hungary

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**Abstract:** Feminist methods have exposed the gendered nature of environmental practices and degradation associated with agricultural development. Studies have shown environmental problems to have uneven gendered effects. Moreover, soil degradation has been linked to the gendered distribution of land, technology, and employment (Carney, 1991; Casey and Paolisso, 1996; Collins, 1991; Rocheleau *et al.*, 1995). Though alternatives have been offered to address weaknesses in conventional approaches, no methodology exists yet to address gendered patterns of soil use and its effects on the environment.

In contrast to previous research, I link the gender division of labour explicitly to soil management by demonstrating that androcentric agriculture can lead directly to soil nutrient imbalances and degradation.

These findings beckon the development of a gender-sensitive methodology that is specific to the soil management aspect of agriculture. Soil use and soil status can be examined more effectively by integrating studies on gender relations with conventional agronomic research.

**Key words:** Soil Science, Gender analysis, Hungary.

### Methods

The study was carried out between 1998 and 1999 in the Ormánság, an area located along the Dráva flood plain in SW Hungary. This is an underpopulated area impoverished by the recent systemic change (Ormányság Foundation *et al.*, 1995). Women and men involved in farming as landowners and/or workers were interviewed separately whenever possible. Two-to-three-hour semi-structured interviews and time-apportionment questionnaires involved a total of 30 families or households (n=106). Nearly all men interviewed are self-employed or employed full-time, while women partici-

pants are mostly part-time employees. The interview participants had a median land-holding size of 3.5 ha for cash-crops and 250 m<sup>2</sup> for subsistence. Soil sampling and analysis were conducted on 21 plots<sup>1</sup>. The sampling was necessitated by the drastic reduction of soil monitoring since 1991. Moreover, subsistence plots, which are associated with women's work, have never been sampled for the purpose of soil analysis. The sampled plots are located on hydromorphic meadow soils (Aquents, Fluvents), while the Ramann-type brownearth forest soil (Aqualfs, Udalfs) characterises sample numbers four and five (see Table 1 below).

### Gender relations of production and soil use

By analysing what constitutes masculine and feminine labour, some of the sources of local soil degradation have become clearer. The interviews reveal that 78% of women's weekly work occurs in the home and nearby subsistence plot, compared to 31% for men. Women process subsistence crops and prepare meals, thereby reinstating their prerogative over subsistence cropping decisions. Men assert their virility through the monopoly of machinery and agricultural inputs. Women predominate in manual labour, while men perform all mechanised work and fertiliser applications. Biocide applications are more evenly distributed, but only on subsistence plots. Labour-saving technologies are monopolised by men, despite women's high level of agronomic training<sup>2</sup>.

Property relations reinforce male control over land<sup>3</sup>. According to a 1995 survey by the Ormánság Development Association, 13% of land owners are women. Yet land ownership does not signify control, which includes the ability to dispose of soil resources. Given male control over machinery and inputs, decisions regarding cropping pattern and input requirements often be-

<sup>1</sup> The results are not directly comparable to those of past soil analyses due to scale differences resulting from the parcellisation of larger plots. Performing a complete sampling of previously larger plots was impeded by difficulties in identifying absentee land owners. Inferences can nevertheless be made regarding soil use differences in general.

<sup>2</sup> Some women interviewees connect this to violent threats directed at women driving any machinery.

<sup>3</sup> Co-operative and state farm management was dominated by men throughout state-socialism (Corrin, 1994).

*Table 1 - 1999 analytical results from subsistence and farm plots. The data represent the outcome of crop production from the previous year. Area is shown in ha. Macronutrient data are shown as mg/kg. OM=Organic Matter (%). NO<sub>x</sub> refers to NO<sub>2</sub>-NO<sub>3</sub> measures. Samples four and five derive from a different soil type*

N	USE	CROPS	pH <sub>KCl</sub>	OM	NO <sub>x</sub>	P <sub>2</sub> O	K <sub>2</sub> O
1	Subsistence	mixed	6.33	1.34	12.2	1849.4	556.8
5	Subsistence	mixed	5.67	1.46	13.8	199.7	200.3
11	Subsistence	mixed	4.94	1.55	10.9	540.4	146.5
23	Subsistence	mixed	6.95	3.2	7.6	2174.5	527.8
25	Subsistence	mixed	6.24	2.58	11.5	1115.2	126.4
2	Cash-crop	water-melon	5.07	1.02	5.7	1362.1	337.1
3	Cash-crop	water-melon	5.59	1.26	6.8	1085.3	348.2
4	Cash-crop	alfalfa	4.77	1.23	17.0	164.6	155.4
10	Cash-crop	oats	3.98	1.33	7.0	287.6	200.3
12	Cash-crop	oats	5.24	1.47	6.3	217.7	176.2
13	Cash-crop	maize	6.45	1.32	11.8	207.3	159.6
14	Cash-crop	maize	4.96	1.36	4.5	184.0	145.8
21	Cash-crop	maize	4.70	1.51	3.0	795.1	202.4
22	Cash-crop	triticale	4.36	1.28	5.5	185.1	167.9
24	Cash-crop	tritic., oats	6.82	1.61	6.2	204.3	104.3

come the sole province of men so that women owners exceptionally control the land they own.

Women affirm their femininity by controlling the decision-making process over lower-input subsistence cropping systems. In this respect, it was not surprising to find generally higher pH<sub>KCl</sub> (average = 6.03) and organic matter content (average = 2.03%) in soils used for subsistence as a result of women's predominance in subsistence agriculture (Table 1). Male control over land, cash-crop systems, machinery, and inputs can lead to soil acidification and possibly compaction on soils used to generate profit. Soils under complete male management had an average pH<sub>KCl</sub> of 5.19, while organic matter content averaged 1.34%.

These soil status disparities result from basic gendered differences in soil use. Subsistence cropping returns higher quantities of plant residue per unit area and exhibits high biodiversity (Soule et al., 1990). The crops women choose tend to be three to five times less nutrient-demanding than cash-crops. Per tonne of crop, cabbage, for instance, requires 3.5-6 kg N, 1.3-1.7 kg P<sub>2</sub>O<sub>5</sub>, and 4.3-7 kg K<sub>2</sub>O. Maize, a main cash-crop in the area, extracts 25 kg N, 13 kg P<sub>2</sub>O<sub>5</sub>, and 22 kg K<sub>2</sub>O (Fageria et al., 1997; Fehér, 1998).

Women and men apportion approximately equal work-time to subsistence plots. This may be historically related to the influx of younger men to house-



Table 2 - Cropping pattern, yield (t/ha), and fertiliser application (kg/ha) at co-operative plot 76/80, considering only the plot section corresponding to the V. family parcel after privatisation in 1991

YEAR	CROP	YIELD	MANURE	NPK
1986	Maize	8.00	0	445
1987	Maize	7.40	0	447
1988	Maize	5.50	0	445
1989	Winter wheat	6.50	0	355
1990	Maize	17.20	0	437
1991	Maize	6.0	2500	0
1992	Triticale, maize	4.0	0	0
1996	Maize	5.9	0	0
1997	Triticale, maize	6.1	3200	700
1998	Triticale, maize	4.3	0	0

hold plot production during the 1970s, when incentives were established for small-scale private farming (Swain, 1985). The division of labour creates a contradiction when it is carried from cash-cropping to subsistence systems. Men, with their emphasis on large-scale production, typically apply too much fertiliser relative to the nutrient demand of the subsistence crops which are chosen by women. Consequently, men's activities in subsistence plots result in excessive macronutrient levels and the possibility of nitrate and phosphate pollution. Table 2 shows a typical sequence of fertiliser application under male control before and after privatisation. What is noticeable is the decreased frequency and greater magnitude of fertiliser placement. This pattern occurs on subsistence plots, as interviews and direct observations attest. In the typical case of the V. family (number 23 in Table 1), the husband spread most of the remaining manure over the subsistence plot in 1997, totalling approximately 25 t/ha. One result is an extremely large concentration of soil  $P_2O$  content (2174.5 mg/kg), a source of eutrophication.

### Conclusion

The results of this study indicate a need for further research on the interconnection between soil use and environmental quality through a large-scale survey. Techniques derived from existing feminist methods have proven crucial to understanding the environmental effects of soil use and to delineating avenues of quantitative research. Integrating this study with previous feminist work, one can deduce a gender-sensitive methodology for soil sci-

ence and agronomy. Soil use is gendered primarily through the division of labour manifested through: 1) uneven land distribution and control, 2) gender-specific technological applications (e.g., tractor use), and 3) gender-specific cropping systems and associated inputs (e.g., fertilisers). Gendered soil use effects changes to soil status that are best appreciated by a thorough understanding of how gender is constructed in terms of the agricultural division of labour.

To understand fully how soil dynamics are shaped by social relations in agriculture, historical gendered patterns of employment, housework, subsistence, land tenure, and technology need to be analysed in tandem with conventional analyses of cropping systems, inputs, mechanisation, and soil quality.

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